

## TABLE OF CONTENTS

<b>General Safety Rules and Responsibilities</b>	<b>3</b>
A. Roles and Responsibilities	4
B. Safety Meetings	5
C. Personal Protective Gear	5
D. Training	5
E. First Aid Kits	5
F. Location of Medical Facilities	5
G. Lane Closure	5
H. Night Work	6
I. Motor Vehicle Safety	6
J. Rope Access Work	6
<b>PEG/PE/Party Chief Safe Work Practices and Responsibilities</b>	<b>9</b>
A. Develop Site Safety Plan	10
B. Implementing Site Safety Plan	10
C. Work Zone	10
D. Stop Drilling	10
E. Encountering Unexpected Hazardous Materials	11
<b>Driller's Safe Work Practices and Responsibilities</b>	<b>12</b>
A. General Safety Practices	13
B. Drillers Are Safety Sensitive Employees	13
C. Motor Vehicle Safety	14
D. Drilling Safety	15
E. Working above the Ground	16
F. Chemical Safety	17
G. Augers	17
H. Housekeeping	17
I. Maintenance	17
J. Electrocution	18
K. Safe Use of Hand Tools	18
L. Proper Lifting	19
M. Fire Safety	20
<b>Equipment Code of Safe Procedures</b>	<b>21</b>
A. CME 750	22
B. Truck and Trailer Mount Drill Rigs	22
C. Boom Truck	22
D. Tenders	23
E. Forklifts	23
F. Barge Operations	23
<b>Appendix</b>	<b>25</b>

CHAPTER I

GENERAL SAFETY RULES

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RESPONSIBILITIES

GENERAL SAFETY RULES AND RESPONSIBILITIES**A. Roles and Responsibilities**

1. All individuals, including Foundation Driller's, Engineering Geologists, Engineers, and any temporary or part-time staff, are responsible for the safety of themselves and their coworkers on a job.
2. Employees, supervisors and managers are all responsible for safety within their individual duties.
3. Senior Engineering Geologists, Senior Engineers, and Senior Driller's:
  - a. Enforce the safety policies of Caltrans, the Engineering Service Center, and the Office of Drilling Services (DS).
  - b. The Senior Engineering Geologist or Engineer in charge of drilling and the Senior Engineering Geologist or Engineer in charge of the project shall approve the Site Safety Plan.
  - c. The Senior Engineering Geologist in charge of developing/implementing the Code of Safe Drilling Practices shall update the Code of Safe Drilling Practices annually, or more often as needed, and provide a Safety Standdown every 12 months for all DS employees.
4. Project Engineering Geologist/Project Engineer (PEG/PE):
  - a. The person in ultimate charge of the project; (s)he is responsible to collect and interpret data and write a report. The PEG/PE coordinates all aspects of the field operation with the drill crew, and any public or private entity that has an interest in the project or field operation.
  - b. Responsible to develop and implement a Site Safety Plan, have the Plan approved by their Senior, and brief the drill crew on the Plan. The features of the Site Safety Plan are included in Section II. A, below.
5. Party Chief:
  - a. The person in responsible charge of the field site operation. If the PEG/PE is on site, (s) he is the Party Chief. If the PEG/PE is not on site, the responsibility is delegated, usually to another Engineering Geologist or Engineer.
  - b. Performs on-site tailgate safety meetings as first order of work to discuss with all staff utility clearances, traffic handling plan, physical hazards and other site-specific issues. If the appointed Party Chief does not perform utility clearances, the PEG/PE must be on site to perform the tailgate safety meetings and be present for each borehole set up.
  - c. Has the shared responsibility with the Lead Driller(s) for ensuring safe work practices are followed at the drill site.
  - d. Documents all safety meetings and forwards the meeting report to Drilling Services.
  - e. Records all information on any safety issue or accident that occurs on the project.
  - f. Coordinates with the PEG/PE, District Maintenance, the District Hazardous Waste Coordinator, Senior Geologist in charge of the project or any other entity as required to resolve of any problem that occurs during the field operation.
  - g. Has the shared authority, along with the Foundation Driller Leadworker, to cease field operations when unsafe conditions develop due to weather, traffic, presence of hazardous materials, or any other condition.
  - h. Has the ultimate responsibility for ensuring safe work practices are followed on any project not involving drilling, such as geophysical surveys and field mapping.
6. Foundation Driller Leadworker:
  - a. Has the shared responsibility with the Party Chief for ensuring safe work practices are followed at the drill site.
  - b. Confirms that a Site Safety Plan has been completed and approved, and does not drill before a tailgate safety meeting has been performed by the PEG/PE or Party chief who developed the Site Safety Plan.
  - c. Checks the Site Safety Plan for underground and overhead utility clearances, verifies the directions to medical facilities, verifies that a copy of all permits are on site, and any other features affecting the drilling operation.
  - d. Instructs new crewmembers, or directs a subordinate to instruct new crewmembers, on site specific safety issues.
  - e. Has the shared authority, along with the Party Chief, to cease field operations when unsafe conditions develop due to weather, traffic, presence of hazardous materials, or any other condition.

**B. Safety Meetings**

1. On site tailgate safety meetings shall be held at the start of each new job and at intervals not to exceed 10 working days, as required by the Caltrans Safety Manual.
2. A staff member as designated by the Supervising Engineering Geologist will perform monthly in-office safety meetings. The designated safety officer will be named during the Fall Safety Standdown and will perform the duties for one year.
3. Participation in the once a year Safety Standdown is mandatory for all staff involved in drilling at which time any changes to the Code of Safe Drilling Practices will be presented by the Drilling Supervisors.

**C. Personal Protective Equipment (PPE)**

1. All personnel working on drill sites shall wear proper safety clothing as required by Chapter 12 of the Safety Manual, including hard hats, eye and ear protection, steel-toed work boots, gloves, and high visibility clothing.
2. All personnel working on drill rigs shall avoid wearing loose clothing or long, free hanging hair that can become entangled in machinery.
3. All personnel shall wear clothing appropriate for the weather conditions.

**D. Training Classes**

1. Basic First Aid and Cardio-Pulmonary Resuscitation (CPR) Training
4. As required by the Caltrans Employee Safety Manual, all Foundation Driller's shall be trained in First Aid and CPR, and receive refresher training at least every two years for First Aid
5. Engineering Geologists and Engineers performing periodic field duties shall be trained in First Aid and CPR, and receive refresher training at least every two years for First Aid
2. Hazards Recognition and Hazards Communication Training
  - a. All staff involved in drilling shall have completed the Hazards Recognition Training and Hazards Communication Training.

**E. First Aid Kits**

1. All DS field staff shall be issued at least a 5-Unit, personal first aid kit. All staff shall have a first aid kit available while on field duties.
2. All DS drilling equipment, including drill rigs, tenders, and the barge, shall be supplied with at least a 16-Unit first aid kit. The lead worker of the crew operating the equipment is responsible to keep the kit stocked and up to date.

**F. Location of Medical Facilities**

All DS personnel working in the field shall be familiar with the location of approved emergency medical facilities in the area, prior to the start of the job.

**G. Lane Closure Safety**

1. All lane closures shall be set up and taken down by District maintenance personnel. Enter the work zone after the lane closure has been established.
2. Review and be familiar with proper lane closure procedures.
3. No DS employee shall work in an improperly set-up lane closure.
4. Review and comply with Chapter 9 of the Caltrans Safety Manual and Chapter 8 of the Caltrans Maintenance Manual of Instructions.

**H. Night Work Safety**

1. Avoid working at night as much as possible.
2. Schedule night work in advance to allow employees to adjust their schedules and avoid unnecessary fatigue.
3. Wear required protective clothing:
  - a. Orange or lime-green vests with reflective strips, and
  - b. White coveralls.
4. Use sufficient illumination.
  - a. Traveling public shall be able to identify location where employees are grouped together and engaged in work activities.
  - b. The lighting shall be oriented so that the traveling public is not blinded.
  - c. The intensity of the illumination should not be any brighter than that necessary to perform the work.
- h) Review and comply with Chapter 9 of the Caltrans Safety Manual and Chapter 8 of the Caltrans Maintenance Manual of Instructions.

**I. MOTOR VEHICLE SAFETY**

All OSF staff shall:

1. Review and comply with all provisions of Chapter 8, Motor Vehicle Safety of the State Safety Manual, including the reporting of all accidents.
2. Be properly licensed and shall operate State vehicles in compliance with federal, state, and local regulations.

**J. Rope Access Work**

For the purposes of this section, *rope access work* is defined as any work where the use of rope(s), technical rock climbing techniques and equipment, are required by Drilling Services management in order to insure the protection of workers, to the maximum extent possible, from sustaining life threatening falls and/or serious injury. Rope Access is further defined in Title 8 (General Industry Safety Orders) of the California Code of Regulations (*see Appendix B*).

1. General Rules
  - a) Drilling Services management must pre approve all rope access work.
  - b) Solo rope access work is prohibited. A minimum of two climbers is required for any rope access work performed as part of a drill site preview and/or reconnaissance. A minimum of four climbers is required for any rope access work involving site preparation and drilling operations.
  - c) Daily safety and work plan meetings are required prior to the start of any rope access work.
2. Staff Selection and Training
  - a) Because of the inherent danger of such work, the risk of serious, as well as life threatening personal injury cannot be ruled out. Rope access candidates are therefore selected from a list of *volunteers* and it is understood that each climber has the right and responsibility to abort any rope access work that they deem unsafe.
  - b) Drilling Services management shall select staff from the list of volunteers for eligibility to active climbing status.
  - c) All active climbing personnel must be in good physical health and condition. In addition, active staff must not be working under any modified work agreement as a result of a medical condition or injury.
  - d) Active staff must have completed an initial 16 hour Rock-Climbing Course and remain current by attending an annual refresher course.
  - e) Active staff must possess a valid Basic First Aide and CPR card.

3. Rappelling

- a) When rappelling, climbers must maintain a minimum of two points of contact with the rope at all times. The *primary point of contact* must be a *CMI Rescue-8 rappel device* or equivalent. The second point of contact may be either an approved self-belay device or a safety prusik (6mm minimum diameter accessory cord). All climbers using a safety prusik as the secondary point of contact must be protected from an uncontrolled descent or fall by means of a belay via a secondary rope.
- b) Prior to rappelling down any rope a simple figure eight knot must be tied a minimum of 4 feet from the end of the rope to prevent accidental separation from the line.
- c) Depending on the specific harness, all harness straps must be doubled backed through their buckles or tied off with an overhand stopper knot.
- d) A locking carabiner is required for securing the rappel device to the harness.
- e) Avoid bounding as well as fast rappels.

4. Rope Usage and Care

- a) All ropes *designated* for rope work shall bare identification markers on each end (A and B) that list the date of manufacture (or purchased/received date), a unique identification number and length.
- b) Rope usage shall be recorded in a logbook that accompanies the ropes' storage bag.
- c) All ropes *designated* for climbing/rope work shall be retired from service after a maximum of 4 years from date of manufacture or receipt date. Retired ropes shall have their identification markers removed from both ends.
- d) Always inspect a rope before and after each use. If in doubt as to a ropes condition, *immediately* retire it from service. A questionable rope is not worth the risk of serious injury or your life.
- e) Never use a *designated* climbing rope for any purpose other than for what it was intended for. It is never to be used for towing vehicles, hauling heavy equipment, tying down cargo, etc.
- f) Always store ropes away from heat, sunlight and chemicals. Keep ropes away from acids, alkalis and oxidizing agents. Avoid contact with battery acid and bleach. Avoid contact with petroleum substances such as gasoline and oil.
- g) Never step on a rope. Stepping on a rope grinds dirt and rock fragments into the rope fiber that may lead to unseen core damage and weakening of the rope over time.
- h) Staff performing any rope access work where they may be exposed to a potential *free fall (dynamic loading)* condition, such as traversing or leading beyond or past an anchor/protection placement must be protected by the use of *dynamic ropes*.
- i) For ascending operations, the use of *mechanical ascenders* shall be used in conjunction with *static ropes* only.

5. Communications

- a) Climbers shall be able to communicate with each other at all times. Two-way radios shall be used whenever distance or distracting background noise (i.e., traffic, drilling equipment, wind, etc.) interferes with normal voice communication.

6. Personal Protective Equipment

- a) All climbers are required to wear a helmet fitted with a chinstrap.
- b) Climbers who wear prescription eyeglasses must wear a retention band with their glasses at all times. In addition, any eye and/or sunglasses worn during rope work must be impact and shatter resistant. Gloves are not mandatory, however their use is strongly recommended, particularly while rappelling.
- c) Protective kneepads should be worn when the risk of potential knee injury is apparent, particularly when rappelling down slopes greater than 60 degrees.
- d) Rugged, leather (or similar man-made material) boots are required for this type of work.

7. Specific Site Safety Plan Requirements

- a) Prior to the startup of any rope access work and as part of the site safety plan, at least one or more locations at, or *reasonably close* to the job site where clear cellular phone transmission/reception can be established must be noted and *all* rope team members made aware of them.
- b) *All* rope team members must also be made aware of the nearest in-service, *landline* telephone location to the job site.

8. Protecting the Public and Others

- a) Rope access operations at sites where rock/debris fall potential exists and endangers the public as well as others will require the use of look outs and/or traffic control.

CHAPTER II

PEG/PE/PARTY CHIEF'S

SAFE WORK PRACTICES

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RESPONSIBILITIES

**PEG/PE/PARTY CHIEF SAFE WORK PRACTICES AND RESPONSIBILITY****A. Develop Site Safety Plan**

The Site Safety Plan Form is provided by the Drilling Section and shall include the following:

1. Underground and above ground utility clearances. Contact Underground Service Alert (USA), non-USA subscribers, and Caltrans for underground and overhead utility clearances. Perform field meets with utility locators. Field meets and utility clearances will be performed before the first day of drilling. A listing of all USA members and non-members with their respective telephone numbers will be provided on the Site Safety Plan. USA must be contacted a minimum of 48 hours before drilling can begin. USA extensions should be called in on the 12<sup>th</sup> day. As required by law, no drilling will commence unless the area to be drilled is clearly marked with white paint and the site has a valid and current USA clearance.
2. Traffic Control Plan. Please make the initial contact with District Maintenance to arrange lane closures, dates, and other District clearances. Drilling Services will coordinate the final arrangements with Maintenance in Lane Closures.
3. Physical Hazard Identification. Note potential or unusual presence of poison oak, snakes, ticks, steep slopes, proximity to water courses, presence of overhead power lines, hypodermic needles, violence toward Caltrans crews from local residents, etc.
4. Location of nearest emergency medical facility, including a map.
5. If hazardous waste is present include items required by the Health and Safety Plan, with approval by the OSF Certified Industrial Hygienist (CIH)/Safety Officer, Drilling Supervisor and the Senior Engineering Geologist or Engineer in charge of the project.
6. Local maintenance yard. Determine if the area has difficult access. Consult, or arrange a field meet, with a Senior Driller to determine drilling equipment requirements. Contact the local Caltrans Maintenance crews for support.
7. Site Constraints. Determine if the area is environmentally sensitive and will require assistance from the District Environmental Section, such as a biologist, archeologist, water quality, etc.
8. Permits. Determine what permits are required to enter the site. Right of way for private property, railroad clearance for drilling on railroad property or drilling within 40 feet of the railroad tracks, or for crossing any railroad tracks to get to the site, Fish and Game Permits for drilling within the high-water mark\_of any water way, County permits, Army Corp of Engineers for drilling on a levee, etc.

**B. Implementing Site Safety Plan**

1. A copy of the Site Safety Plan will be supplied to the Scheduling Senior Driller no later than two working days before drilling begins,. The Scheduling Senior Driller will supply a copy to the Lead Driller prior to departure so that all necessary tools, equipment and supplies required to complete the job are packed and available at the job site.
2. Discuss and implement the Site Safety Plan at each new job site, and ensure safety meetings occur every 10 working days.
3. Ensures that a Safety Meeting Report Form (PM-S-0110) is properly filled out and signed by all attendees, and provide copies of the Form to Drilling Services.
4. Verifies that all crewmembers attend the safety meeting including the Lead Driller(s), Foundations Driller(s), Student Assistant(s), Volunteer Aides, and any California Conservation Corps members.
5. The directions to the local medical facilities will be verified by driving from the site to the hospital.
6. Copies of all necessary permits will be provided to the Scheduling Senior Driller, Lead Driller or Acting Lead Driller, and any further information relevant to the drilling operation.

**C. Work zone during drilling operations**

1. The Party Chief will designate the work zone and the Lead Driller based on site constraints before drilling begins. Preferably, the geologic work station should be set up outside of the immediate drilling work area a distance of at least 1.5 times the mast height away from the drill.
2. Stay alert to drill rig malfunction, falling objects and traffic hazards.
3. Inform Lead Driller of any perceived safety hazards while drilling.
4. Communicate and coordinate work with local maintenance crews as necessary.
5. Know where the “kill” switch is located on the drill rig.

**D. Stop drilling operations until safety hazards are corrected.**

**E. Encountering unexpected Hazardous materials**

If hazardous waste is encountered in types or quantities not anticipated when the Site Safety Plan was developed, it shall be of paramount importance to close down the drilling operation while maintaining the safety of the crew.

1. The Foundation Driller Leadworker shall contact the Drilling Senior Engineering Geologist Supervisor (SEG) immediately when suspected hazardous waste has been encountered. The Foundation Driller Leadworker, along with the SEG, shall have primary responsibility to determine the amount of work, if any, that the crew shall perform in closing down the site.
2. The Party Chief shall assist the Leadworker in all ways possible to determine the severity of the situation, including operating air-monitoring equipment such as an organic vapor analyzer or combustible gas indicator. The Party Chief shall contact the District Environmental, and/or the Safety and Health Office for clearance. Before drilling may resume, the Party Chief must provide clearance verification to the SEG.
3. If it is determined that it is safe to do so, the crew shall containerize the drill cuttings and drilling fluids and backfill the hole with grout.

CHAPTER III

DRILLER'S

SAFE WORK PRACTICES

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RESPONSIBILITIES

DRILLER'S SAFE WORK PRACTICES AND RESPONSIBILITIES**A. General Safety Practices.**

All Office of Structural Foundations (OSF) Driller's shall:

1. Operate as a team in which every crewmember is responsible for his own safety and that of each of the other crewmembers.
2. Know their individual duties so that work can progress smoothly, efficiently and safely.
3. Stay alert with their minds on their jobs.
4. Stay observant for safety problems and correct them as they occur or report the problem to the lead worker.
5. Use all required and recommended safety equipment.
6. Refrain from engaging in practical jokes around the drilling rig and work site.
7. Get proper rest and nutrition so that they report to work in a physically and mentally fit condition.
8. Never work under the influence of alcohol or drugs, whether legal or illegal.
9. Pass an operational capability test administered by the employee's supervisor or supervisor's representative on each type of equipment the employee will operate on state business *prior to operating the equipment unsupervised.*
10. Always use the buddy system whenever working on the highway;

**B. Driller's are designated as Safety Sensitive Employees and are Prohibited from the Following Conduct:****Alcohol\***

- c) Perform Safety Sensitive functions while having an alcohol concentration of 0.04 or greater.
- d) Operate a commercial vehicle while possessing alcohol. This includes the possession of medicines containing alcohol (prescription or over-the-counter), unless the packaging seal is unbroken.
- e) Use alcohol while performing safety-sensitive functions.
- f) Perform safety-sensitive functions within four (4) hours after using alcohol.
- g) Use alcohol for eight (8) hours after an accident requiring a post-accident alcohol test or until a post-accident is administered, whichever occurs first.
- h) Refuse to submit to a post-accident, random, reasonable suspicion, or follow-up alcohol test
- i) No CDL holder who is found to have an alcohol concentration of 0.02 or greater, but less than 0.04, shall perform or continue to perform safety-sensitive functions, including driving until the driver's next regularly scheduled duty period, but not before 24 hours have passed since the alcohol test.

**\*Alcohol includes any intoxicating agent in beverage alcohol, methyl, and isopropyl alcohol whether used for medicinal purposes or not.**

**Drugs\*\***

1. Perform a safety-sensitive function when the driver uses any controlled substance, except when the use is under the instructions of a physician who has advised the driver that the substance does not adversely affect the driver's ability to safely operate a commercial vehicle.
  - i) Refuse to submit to a post-accident, random, reasonable suspicion, or follow-up drug test.

**\*\*Drugs or controlled substances include marijuana, cocaine, amphetamines, opiates and phencyclidines.**

*Any CDL holder who has engaged in prohibited conduct shall be immediately removed from the performance of any safety-sensitive function related to a commercial vehicle, including driving, and may not perform any safety-sensitive functions until certain evaluations have been met as outlined in the Caltrans "Commercial Driver's License Holders Handbook", Office of Labor Relations, Drug Testing Branch, Revised April 1, 2000.*

**C. Motor Vehicle Safety**

All Drilling Services Driller's shall:

1. Review and comply with all provisions of Chapter 8, Motor Vehicle Safety of the State Safety Manual, including the reporting of all accidents.
2. Be properly licensed and shall operate State vehicles in compliance with federal, state, and local regulations.
3. Pass a road test administered by the employee's supervisor or supervisor's representative. Every car, truck, tractor and drill rig has its own handling characteristics; every new driver shall learn these characteristics in the company of an experienced driver. Every employee shall be qualified on each type of vehicle/equipment the employee will operate on state business *prior to operating the vehicle/equipment unsupervised*.
4. Know the dimensions of any equipment (s) he is driving, including the required overhead clearance, and the width, length and weight of the rig. The driver also shall know the load limits for highways and bridges, and be certain that the vehicle is not exceeding those limits. NOTE: Service stations and motels frequently have canopies and electrical service lines that are too low for a drill rig to clear; extreme caution must be used in these areas.
5. Pre-op equipment before leaving the yard and be familiar with operator's manual.
  - a. Equipment that is in an unsafe condition shall not be operated. Notify the Equipment Senior Driller immediately of all vehicle problems.
  - b. Vehicles shall not be used unless the brakes are in sound working order.
  - c. Check logbooks to be sure all scheduled PM's (preventive maintenance) have been completed and the Pre-op, Charge book and Driver's logbook are all current.
6. Check brake connections, pintle hook, and safety chain before towing a trailer.
7. Never overload the tender or any other vehicle.
8. Properly load and secure all cargo.
9. Use proper mounting/dismounting techniques when climbing into and from vehicles/equipment. Face the equipment and use the hand and foot holds provided. Do not jump off equipment.
10. Use vehicle ladders to access truck beds. Do not climb on tires.
11. While on state business, seat belts and shoulder harnesses will be used in state vehicles, rental vehicles or private vehicles, or, as the vehicle is equipped.
12. Maintain adequate vision by keeping the windshield, windows and mirrors clean.
13. Keep wipers in good condition.
14. Keep tires properly inflated.
15. Keep slack adjusters on air brakes properly adjusted.
16. Allow engine to reach operating temperature before using full capacity operation.
17. Keep vehicles clear of unsecured objects or materials that could fall off.
18. Keep cab neat and orderly with no loose objects on floor or dashboard.
19. Move their disabled vehicle off the road and set out flares and reflectors or cones, and leave trouble lights on and flashing.
20. Never work under a vehicle unless steps have been taken to prevent it from rolling. In addition to setting the parking brake, chock blocks and/or other methods shall be used to secure the vehicle to prevent movement.
21. Never leave mobile equipment unattended unless the controls are placed in gear or the Park position and the parking brake is set. When parked on a grade, the wheels shall be chocked or turned into the bank.
22. Allow for mast overhang when cornering or approaching other vehicles or structures.
23. Never pick up hitchhikers in State vehicles.
24. Not operate trucks 1-ton and above unless equipped with automatic backup alarms.
25. Never drive onto an off-road site without first walking the route to check for depressions, rocks, stumps, gullies and similar obstacles.
26. Use caution when traveling side-hill. Be conservative when evaluating side-hill capability of the rig; loading of drill rod, tools and equipment may have raised the center of gravity. Whenever possible, travel directly uphill or downhill;
27. Always walk around the truck prior to backing to assure that the area behind the truck is clear of equipment and workers.
28. Use an assistant on the ground to help guide whenever lateral or overhead clearance is close.
29. Never back out of a site onto a highway, unless traffic control is provided.
30. Always position the vehicle in the safest possible place at drilling locations.
31. Never move a drill rig with the mast up.
32. When working in a lane-closure, always have District Maintenance set up the lane closure. Do not enter the lane closure until it is set up. All lane closures must comply with Chapter 8 of the Maintenance Manual. It is the responsibility of all members of the drill crew to be familiar with the provisions of Chapter 8 of the Maintenance Manual; do not work in an improperly set up lane closure.
33. CDL holders required by DMV to wear corrective lenses must wear them at all times performing Safety sensitive duties.

**D. Drilling Safety**

1. Site preparation
  - a. No drilling, trenching or other underground work shall commence unless Underground Service Alert (USA) has provided clearance for the site and underground utility locations are clearly marked. The Geologist/Engineer Party Chief is generally responsible to obtain the USA clearance; however, it is the driller's responsibility to verify the clearance has been obtained and it is safe to drill.
  - b. Prior to move-in, the site should be adequately cleared and leveled to accommodate the drilling equipment and supplies, and to minimize fire hazard.
  - c. Do not commence drilling if tree limbs unstable ground or tripping hazards create unsafe drilling and/or tool handling conditions.
2. Blocking the Rig
  - a. Before the mast is raised, the rig must be leveled and stabilized with the leveling jacks.
  - b. Carefully evaluate the drilling site prior to setting the leveling jacks, especially if the location is on water saturated, frozen, or loose, caving soil. Do not set up on sloped ground. If necessary, build up solid, compacted earth where the jacks contact the ground.
  - c. The leveling jacks should be set on timbers of sufficient strength to support the load.
  - d. The drill rig should be re-leveled if it settles after initial set-up.
3. Raising the Mast
  - a. Only qualified personnel shall raise or lower the mast.
  - b. Prior to raising the mast, it should be checked for loose objects such as equipment and tools, and inspected for any damaged parts.
  - c. Check Overhead For Obstructions; **BE PARTICULARLY OBSERVANT FOR UTILITY LINES.**
    - (1) By law, a 10-foot clearance must be maintained between the mast and high voltage lines of up to 50,000 volts. Because of the difficulty in estimating distances from the ground and the effects of wind on the power lines and hoist lines of the mast, it is advisable to maintain a 20-foot clearance.
    - (2) Power lines carrying greater than 50,000 volts must have greater clearance, according to the table in Section III-I, "Electrocution." If any question exists regarding the necessary clearance, the Leadworker or Party Chief shall check with the Power Company or Cal-OSHA prior to drilling.
  - d. Raise the mast only after the leveling jacks are down. Do not raise the jacks until the mast has been lowered completely.
  - e. Clear all personnel away from the sides and back of the rig prior to raising the mast; no other work shall be performed in the vicinity of the mast while it is being raised or lowered. Inform personnel in the area that the mast is being raised.
  - f. Before starting drilling operations, secure and/or lock the mast as required by the drill rig manufacturer.
4. Equipment Inspection
  - a. Equipment shall be inspected at the start of each shift (pre-op) and at the end of each shift (post-op).
  - b. All major defects and safety defects shall be corrected prior to the start of work.
6. All hydraulic hoses, connections, fittings and valves shall be checked and replaced if necessary.
7. Notify Senior Driller of any equipment with necessary repairs immediately.
5. Drilling
  - a. General Operation:
    - (1) No visitors shall be permitted in the vicinity of the work area without proper protective clothing and authorized permission.
    - (2) Start all engines according to the manufacturer's recommendations, with all gearboxes in neutral, all hoist and hydraulic levers disengaged and the cathead rope, if used, off of the cathead.
    - (3) If the operator of the rig must leave the area of the controls, he operator should shift the transmission controlling the rotary drive and the feed control to neutral.
    - (4) One-person operation of drill rigs is not allowed.
    - (5) All crew members shall be familiar with basic controls of the rig, including how to stop the engines, align the kelly with the borehole, raise and lower the drive head, raise and lower hoists, and chuck and unchuck the rods.
    - (6) The manufacturers' technical specifications for items such as speed, force, torque, pressure, and flow shall not be exceeded.
    - (7) Use the drill rig and tools only for their intended and designed purposes.
    - (8) If drilling in an enclosed area, make certain the exhaust fumes are vented from the work site.
    - (9) If drilling with air, the exhaust and cuttings shall be directed away from the workers.
    - (10) Never operate the drill rig with any of the machinery guards removed.

- (11) Drill rods and sampling barrels should never be left unsecured, leaning against or balanced across the drill rig.
- (12) Never exceed the pipe and rod racks design maximum load.
- (13) Always make provisions to prevent stock from accidental rolling.
- (14) When core is being extruded from a core barrel, hands should be kept out of line of the end of the barrel.
- (15) Safety chains or cables shall be attached to swivel, air, and other pressure hoses.
- (16) When cranking pumps or other motors keep head well back of the crank area to avoid being hit when motor turns over.
- (17) Fugitive dust control is to be used during dry drilling, especially in potential areas of naturally occurring asbestos.
- b. Adding and Removing Drill Rod:
  - (1) Only the drill operator shall brake or set the chucks, to eliminate the possibility of engaging the transmission prior to removing the chuck wrench.
  - (2) Do not use the chucks as a brake on a string of drill rods that are being lowered into a hole. Braking the drill string with the chuck will result in metal slivers on the drill rod and consequent hand injuries, and could result in losing the drill rod down the hole.
  - (3) The chuck jaws shall be periodically checked and replaced as necessary.
  - (4) Never place hands on wrenches where they can get trapped between the wrench and the drill rig.
  - (5) Ensure that wrenches are removed from rods before starting to drill.
  - (6) Do not take hold of the male thread end of drill rod. Watch for sharp burrs on rods and casing, and file sharp edges off rods when necessary.
  - (7) Use of extension leverage on pipe wrenches to break drill rod should be avoided whenever possible. If extension leverage is needed, the wrong tool is probably being used. In rare instances where extension is required, use extreme caution to avoid slippage and possible injury.
  - (8) Drill rod shall be cleaned with a rubber wiper or other suitable device when being removed from a hole.
  - (9) Allow drilling fluids to drain from drill rods into the mud pit before setting the rod to the side, to minimize the amount of mud around the work area.
  - (10) The operator shall know the capacity of the hoist and mast, and the weight of the drill rod, to prevent the hoist capacity from being exceeded.
  - (11) The drill rig operator must exercise care to lower the hoist slowly while the drill rod is being carried away from the hole.
  - (12) There should be at all times at least three wraps of hoisting line on the hoist drum to prevent a line load from being applied directly to the fastening clamp.
  - (13) Do not guide or hold onto moving wireline work cables with bare hands.
6. Inclement Weather
  - a. Although drilling operations can proceed through a wide range of weather conditions, operations shall cease if weather conditions are severe enough to create a safety hazard.
  - b. Safety hazards from weather may include, but are not limited to, low visibility for approaching traffic, inability for the driller's to see, grasp or handle equipment, and rough seas while working on the barge. Other conditions can create safety hazards, and shall be decided in the field.
  - c. The Foundation Driller Leadworker and the Party Chief share the responsibility to determine if the severity of the conditions warrants stopping the drilling operation.
  - d. Lightning.
    - a. Never operate a drill rig during a lightning storm.
    - b. If a storm is moving in, abandon the hole and lower the mast well before the storm is in the immediate vicinity.

## E. Working Above the Ground

1. No person shall work 6.5 feet or more above the ground or ascend or descend the mast unless wearing an approved safety harness, correctly fitted and adjusted, hooked onto a climbing safeguard device. No person shall attempt such activity without having first received training in the correct procedures by a competent instructor
2. Tools must either be properly secured to the body when climbing a ladder or be lifted using a hoist line. Always have both hands free and face the ladder when climbing.
3. The rig operator and whoever is working above ground shall work out clear signals prior to ascending the mast.

**F. Chemical Safety**

1. Know the chemical properties of all additives and substances used during the operation prior to their use. Check the Material Safety Data Sheets in the Right to Know Station in the shop prior to departing for the job.
2. MSDS sheets must be available to the drill crews at all times. Make sure copies of MSDS sheets are located in the trucks and tenders before departing for the job.
3. When mixing mud, use caution to avoid getting dry or wet mix in the eyes. If mix does enter the eyes, flush immediately with clean water. Dust masks or respirators should be worn when mixing grout, dry mud, silica sand or fillers.
4. Goggles or a full-face shield is required when mixing any materials such as caustics that could cause eye burns or injury.
5. Some additives can cause burns or skin rash. Always wash hands face and arms after contact.
6. Fresh cement can cause skin burns upon prolonged contact; always wash hands after mixing or handling cement.
7. Gasoline can cause chemical burns to skin. Wash skin and/or clothes after contact with gasoline.
8. Do not wash clothes in gasoline.
9. Clothing and coveralls that become greasy after a few days shall be changed for clean ones so as not to become a fire or health hazard.
10. Oxygen and acetylene cylinders will be secured upright while on a truck or the ground. When not in use, caps will be placed on the bottles. Gauges and regulators shall be kept clean and free of oil and grease. Regulators and hoses shall be checked before each use and replaced as needed.

**G. Augers**

1. Do not clean auger flights while the auger is rotating.
2. Use only tight-fitting pins on the auger sections. Replace pins as they become worn.
3. Make sure pins have been adequately tightened prior to entering the hole.
4. Never use mis-matched sections of augers.
  - e) Never lift auger flights by yourself. Have a second person assist or use mechanical methods.
6. Minimize fugitive dust by spraying dry soil with water.

**H. Housekeeping**

1. Establish a suitable location for storage of tools, equipment and supplies so those items can be safely and conveniently stored and located when needed. Store items so that the work can proceed in an orderly fashion, with sufficient room in the work area to move about without tripping over supplies or equipment. Do not store equipment in places that would interfere with escape routes in an emergency.
2. All tools supplies and equipment shall be kept in their proper places.
3. Every crewmember shall inspect the work site upon his arrival to assure that equipment is in safe condition and the job site is in proper order. Return the job site to proper order prior to proceeding with work.
4. Avoid storing or transporting tools, materials or supplies within or on the mast of the drill rig.
5. Drill rod, casing, augurs and similar tools should be orderly stacked on racks to prevent sliding, rolling, spreading or falling.
6. Work areas, platforms, walkways and other access-ways should be kept free of obstructions such as materials and tools, and substances such as debris, grease, ice and mud, in order to minimize the tripping, slipping and falling hazards around the drill rig.
7. All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, visitors or animals from stepping or falling into the hole.
8. Used approved cleaning solvents instead of flammable liquids as cleaning agents on or near a drill rig.
9. Never use compressed air for the purpose of cleaning clothes.
10. All trash should be placed in bags and stored in areas outside of the immediate work area.
11. All controls, meters, dials, and operational and warning lights should be kept free of dirt, grease and mud.
12. Keep all flammable liquids in proper containers and stored away from heat and spark sources.
13. All drilling fluids must be contained and disposed off-site, as required by the Storm Water Law of 1997.

**I. Maintenance**

1. Have all PM's and other scheduled maintenance completed as recommended.
2. Shut down the drill rig to clean, repair or lubricate fittings, unless the adjustment requires the rig to be running. The operator and lubricator must coordinate their efforts to successfully perform the maintenance safely.
3. While performing maintenance, either remove or tag the key to prevent accidental starting of the rig.
4. Apply grease and oil only through oil and grease inlets.

5. Always block wheels lower leveling jacks and set hand brakes prior to working under a drill rig.
6. Whenever possible, reduce operating systems to a zero energy state, that is, release all pressure from hydraulic, drilling fluid and air pressure systems, prior to performing maintenance. Use extreme caution when opening drain plugs, pressure caps, valves, and removing hoses and hydraulic lines.
7. Do not weld or cut on or near a fuel tank.
8. Replace all caps, plugs, clamps, cables and guards prior to returning the rig to service.
9. No alteration shall be made to any part of the mast without permission from the equipment shop.
8. If it should become necessary to drain oil, fuel, hydraulic fluid or any other industrial fluid in the field, do not allow the fluid to drain onto the ground. The fluid must be caught in a container and disposed of in an appropriate manner. Avoid spillage as much as possible.
9. All cab areas shall be clean and free of loose materials, equipment, tools and unsecured personal items.

## J. Electrocution

1. The most frequent cause of job-related death in the drilling industry is electrocution caused by contact of the drill rig with overhead power lines. Whenever possible, locate borings to avoid any possibility of contact with power lines.
2. If drilling near power lines is unavoidable, try to maintain at least 20 feet of clearance between the power lines and the mast of the drill rig. At least 10 feet of clearance must be maintained between the mast and high voltage lines of up to 50,000 volts to comply with state law. Higher voltage lines require additional clearance, according to the following table:

TABLE 1	
Nominal Voltage (Phase to Phase)	Minimum Required Clearance (feet)
600 to 50,000	10
over 50,000 to 75,000	11
over 75,000 to 125,000	13
over 125,000 to 175,000	15
over 175,000 to 250,000	17
over 250,000 to 370,000	21
over 370,000 to 550,000	27
over 550,000 to 1,000,000	42

3. Always contact the Power Company for advice before drilling, and determine if the power line can be shut down while working.
4. Never raise the mast of the drill without a designated spotter.
5. If contact between the rig and power lines occurs:
  - a. Assume the entire rig to be electrified. Do not attempt to enter or leave the rig or touch any part of it. Although people in the rig may not be affected, anybody touching the rig while in contact with the ground is in danger of being electrocuted.
  - b. Have someone call the power company and the local fire rescue squad immediately for assistance.
  - c. Do not touch any person who may be in contact with the current.
  - d. If a rescue is attempted, use a dry, clean rope or a dry, unpainted wood pole to remove the victim. **Do not touch the victim until he has been removed from the current.**
  - e. If the victim is unconscious when released from the current, check his breathing and pulse and, if needed, begin CPR immediately.

## K. Safe Use of Hand Tools

1. Always observe The Basic Rule: Use a tool only for its intended purpose, and always use the proper tool for the job.
2. Do not use tools with split or defective handles or worn parts. If a tool becomes damaged, repair it before using it again or return to the Drilling Inventory Manager for replacement.
3. Never use excessive forces on a tool. If excessive force is required, the wrong tool is being used.
4. Use safety glasses whenever using a hammer, chisel, power tool or any other tool that can cause particles to fly.
5. Keep all tools clean and orderly stored when not being used.
  - a. Do not leave tools on ladders or other overhead working spaces.
  - b. Do not leave tools on the ground.
6. Never throw or drop tools. Use hoists or hand lines to raise or lower tools.
7. Always use non-sparking tools in areas of potentially explosive materials or atmosphere.
8. Hammers:
  - a. Use only hammers that are in good condition with handles firmly attached. Repair or replace hammers with defective handles or mushroomed heads. If the head has mushroomed, dress it prior to using it. When repairing a handle, never use nails as a substitute for a wedge.

- b. Always grip the handle close to the end. "Choking " the grip is less accurate and effective.
  - c. Set nails with a light blow to minimize the possibility of finger injuries.
  - d. Always use a hammer with a flat face to drive nails; never use a machinist's hammer for this purpose.
  - e. Never pound objects with the hammer's handle.
  - f. To prevent flying metal splinters, never strike a hardened object such as a wrench or another hammer with anything but a rawhide or soft-metal hammer.
9. Wrenches:
- a. Use a wrench of adequate size; a larger wrench is safer than using a cheater pipe.
  - b. If using an adjustable wrench, note that the fixed jaw is stronger than the movable one.
  - c. If possible, pull on a wrench using your arm muscles rather than push on it.
  - d. Maintain good footing, one foot bracing behind the other, when using a wrench. Remove sharp objects from the area in case of a fall.
  - e. Position your hands so they will not be crushed or smashed if the nut or joint releases.
  - f. Never apply a wrench to moving machinery.
  - g. Never use a wrench as a hammer.
  - h. Wire brush the jaws of pipe wrenches frequently, and replace worn jaws periodically.
  - i. Use wrenches - not pliers - on nuts.
10. Screwdrivers:
- a. Always use a screwdriver that closely fits the screw slot.
  - b. Never use a screwdriver with a worn, chipped or broken tip.
  - c. Never use a screwdriver as a substitute for a chisel or pry bar.
11. If an accident occurs, treat all cuts and scratches immediately with simple first aid measures to prevent infection, which can occur in a matter of hours.
12. Keep cutting tools sharp.
13. Power tools.
- a. Always read the owner's manual of the tool that you are using to learn the correct application and the limitation of the tool.
  - b. Lubricate tools as recommended by the manufacturer.
  - c. Power tools shall always be properly grounded.
  - d. Never operate power saws or grinders without safety guards.
  - e. Never run power tools in damp or wet locations.
  - f. Always have proper lighting when using power tools.
  - g. Don't abuse the cord - never carry a tool by its cord, or yank the cord to remove the plug from a receptacle.
  - h. Secure the work with clamps to allow both hands to be free to operate the tool.
  - i. Remove adjusting keys and wrenches prior to starting the power tool.
  - j. Keep the work area clean and free of clutter that can interfere with the work or get caught in the power tool.
  - k. Do not wear loose clothing or long hair that could be caught in the tool.
  - l. Don't over-reach; keep good footing and balance when using power tools.
  - m. Don't carry plugged-in tools with your finger on the start switch.
  - n. Disconnect all tools from power source when not in use and when servicing.

## **L. Proper Lifting**

- 1. Make certain that one person can safely lift the load.
- 2. If possible, use a mechanical lifting device.
- 3. Inspect the route to be sure that there are sufficient clearances and no obstructions or spills on the floor.
- 4. Inspect the object to be carried. Be careful of sharp edges, slivers or other things that could cause injury.
- 5. Keep feet parted so that one foot is along the side and one is behind the object.
- 6. Keep the back straight and nearly vertical so that the spine, back muscles and organs are all in proper alignment, with the body weight directly over the feet.
- 7. Keep the chin tucked in.
- 8. Bend the knees.
- 9. Assume a squatting position.
- 10. Grip the object with the whole hand.
- 11. Keep the elbows and arms tucked in as much as possible.
- 12. Start the lift with a thrust of the rear foot, and lift with the legs.
- 13. When carrying the object or setting it down, never twist the body.
- 14. When setting the object down, stand as close to the unloading point as possible.
- 15. Never lift auger flights by yourself. Have a second person assist or use mechanical methods.

**M. Fire Safety**

1. Personnel shall always be alert to fire hazards and take appropriate actions to prevent fires.
2. Welding and cutting shall be completed, as possible, in the yard to avoid the need for emergency repairs in the field.
3. In off-road areas, the area around the drill rig shall be cleared of combustibles such as dry grass and trash.
4. Flammable liquids shall be stored where they are inaccessible to vandals.
5. No smoking is allowed within 25 feet of refueling areas.
6. Funnels and pour spouts shall be used to avoid spilling fuels.
7. Gasoline and diesel motors shall not be refueled while in operation or when hot enough to ignite highly volatile vapors.
8. A suitable (multi-purpose Class ABC) fire extinguisher shall always be available while refueling.
9. Fuel tanks shall not be overfilled; room shall be left in the tank for fuel expansion, especially in hot weather.
10. Only approved containers shall be used for fuels.
11. All drill rigs and tenders shall have fire extinguishers in easily accessible locations.
12. There shall always be a fire extinguisher on site while work is in progress.
13. All fire extinguishers shall be maintained in good condition.
14. All members of the crew shall be trained in the use of fire extinguishers.

CHAPTER IV

EQUIPMENT CODE

OF

SAFE PROCEDURES

EQUIPMENT CODE OF SAFE PROCEDURES**A. CME-750**

1. Loading and unloading:
  - a. Use ramps of adequate design that are solid and substantial enough to bear the weight of the drill rig with carrier and tooling.
  - b. Load and unload on level ground.
  - c. Always use the assistance of another person positioned as a spotter.
  - d. The drill rig should be loaded and secured on the trailer in accordance to the requirements of the Equipment Shop.
  - e. The drill rig and tools should be secured to the trailer with ties, chains and /or load binders of adequate capacity.
  - f. After arriving at the unloading area, check the position of all levers and switches to confirm that the rig is in driving mode and not drilling mode, as per the CME instruction manual.
2. Always transport the CME-750 with an empty water tank. Fill the water tank as close to the work site as possible.
3. When transporting the CME-750, it is important to check the tie-down after five or ten miles; afterwards, recheck the tie-down periodically (approximately every 100 miles).
4. Be aware of the high center of gravity of the CME-750 during transport and while driving the rig; avoid driving on the side of hills.

**B. Truck and Trailer-Mounted Drill Rigs**

1. Be aware of the large dimensions of the truck-mounted rigs.
2. Backing
  - a. Always walk route prior to backing rig into site location.
  - b. Always walk around rig prior to backing.
  - c. Always use a spotter when backing.
  - d. Maintain awareness of potential of jackknifing.
3. Winching
  - a. Set brakes on truck.
  - b. Charge air lines on rig to release brakes.
  - c. Never deploy excessive length of cable.
3. Operating.
  - a. Do not operate rig unless properly leveled, with out riggers deployed.
  - b. Operate rig at slow speed in high gear for smooth operation and to prevent twisting of drill stem.
  - c. Check all hoses for wear and position of safety restraints.
  - d. Check for plugged hoses before operating pumps.
  - e. Check that the pressure relief valves are functioning and are not sanded in.
  - f. Do not stand on elevated decks of any rig while the rig is operating, unless a special task needs to be performed. Always inform the drill operator prior to entering the elevated area.

**C. Boom truck**

1. State law prohibits operation within 10 feet of from high voltage lines.
2. Check boom for cracks, deformities, oil leaks, loose pins, loose nuts and bolts.
3. Be sure the boom hook is in good condition with hook free from spreading or cracking, hook pins secure, and safety catch working properly.
4. Slings, cables and chains shall be properly labeled with the correct lifting capacity.
5. Slings, cables and chains shall be inspected each day prior to use for deformities, kinks, and frayed wire.
6. When not in use, store the boom in its proper storage position.
7. Prior to traveling, check that the boom is in the proper storage position for traveling.
8. Never travel with the power take off engaged.
9. Never exceed the maximum lifting capacity of the boom in its different extensions and positions; always refer to the load chart.
10. Outriggers:
  - a. Check and use outrigger safety locks and warning lights.
  - b. Never use outriggers for lifting.
  - c. Keep outriggers in site when lowering.
  - d. Do not operate the boom unless the outriggers are down and supported with planks or blocks as necessary.
  - e. When setting outriggers, check clearance of outriggers to adjacent lane or sidewalk.
11. Only one person shall operate the boom during a job.
12. Only one person shall assist and signal the boom operator.
13. Always use a straight pull when using the boom.

14. Change directions slowly when swinging the boom.
15. Never rock the boom.
16. Never swing the load to position it.
17. When operating the boom over or near the roadway, maintain safe clearance from passing vehicles or provide traffic control.
18. Never pull objects directly toward the operator's position; the operator shall use the remote control to stay out of the path of the load.
19. Use a sling with a shackle instead of a chain with grab hooks to lift loads.

**D. Tenders**

1. Prior to driving, make sure that all toolbox doors are secured and locked.
2. Make sure the load is secured.
3. Make sure that the load is below the level of the headache rack.
4. Make sure that the water tank lid is secured.
5. Make sure that no materials, including water, is being dumped on the highway.
6. If a hydraulic boom is present, make sure it is locked in position and unable to rotate.

**E. Forklifts**

1. Only certified operators by the employer and trained in the safe operations of industrial trucks or industrial tow tractors shall be permitted to operate.
2. Rated capacity must be posted on forklift.
3. Riders are not allowed on forklifts.
4. Loaded forklifts shall not be moved until the load is safe and secure.
5. All unattended forklifts shall have mast at vertical position, forks in the down position, engine shut down and the parking brake set.
6. Forklifts shall not be driven towards anyone standing in front of a fixed object where such person could be caught between the forklift and object.
7. Operators shall look in the direction of travel and shall not move forklift until certain that all persons are clear.
8. The forks shall always be carried as low as possible, consistent with safe operation.
9. Forklifts shall not be driven into and out of vehicles at loading docks until such trucks are securely blocked and brakes set.
10. Employees shall not place any part of their body between mast uprights or other parts of the forklift where shear or crushing hazards exists.
11. Employees are not permitted to stand, pass or work below the elevated portion of a forklift.
12. The operator shall slow down and sound the horn at all locations where visibility is obscured or obstructed.
13. If the load obstructs forward view, the operator shall be required to travel with the load trailing, unless traveling uphill.
14. Extreme care shall be taken when tilting loads.
  - a. Tilting forward with forks elevated is prohibited except when picking up a load.
  - b. Tilting elevated loads forward is prohibited except where the load is to be deposited on a storage rack or equivalent.
15. Special precautions shall be taken in the securing and handling of loads by forklifts equipped with special attachments, and during the operation of these trucks after loads have been removed.
16. When lifting employees with a forklift:
  - a. Use an approved basket.
  - b. The operator shall be at the controls at all times.
  - c. The basket shall be secured to the forks.
  - d. A mast guard shall be in place.
  - e. The mast shall be kept in a vertical position.
17. Whenever traveling without a load, the forks shall be tilted to the rear to prevent the tips of the forks from contacting the ground.

**F. Barge**

1. Pre-op boat and barge. NOTE: Pre-op of boat and barge is particularly important because our crews do not use this equipment on a regular basis. Deterioration or modification may have occurred since last use. Other divisions in Caltrans use the boat; it may have not been left in the same condition.
  - a. Check tires on trailers.
  - b. Check tie-downs on boat and barge.
  - c. Check that trailers are properly connected: hitches are closed, locked, safety chains installed, lights connected and functioning.
  - d. Check boat fuel, battery and radio.
  - e. Inspect barge and boat for structural damage.

2. Assembly
  - a. Crew size.
    - (1.) Have a sufficient crew for the unloading and assembly operation. The minimum number of workers that should attempt to unload the barge is three, deployed as follows:
      - One person operating boom controls;
      - One person connecting sling to barge sections;
      - One person operating the tag line and assembling the barge.
    - (2.) It is preferable, for a safe and efficient operation, to have a fourth person assisting the tag line operator with the barge assembly.
    - (3.) If a fifth person is available, that person should serve as a group coordinator, observing for safety problems and assisting where ever required.
  - b. Properly level crane prior to unloading.
  - c. All outriggers shall be set prior to unloading.
  - d. Check slings cables and chains prior to unloading for signs of wear, kinks, or deformities. Do not attempt to use worn equipment.
  - e. Attach sling to proper three points on each barge section.
  - f. Only personnel working on barge unloading and assembly shall be in the immediate work area; all other observers shall remain clear of the area.
  - g. Do not allow barge sections to rotate freely while unloading. At least one person shall guide barge sections using a tag line.
  - h. Crane operator and tag line operator shall be in direct communication, with clearly understood pre-arranged signals, while unloading.
  - i. All personnel shall be alert for overhead-suspended hazards.
  - j. Barge shall be assembled using designed configuration of barge. Make connections with all designed pins.
  - k. When backing rig onto barge, be sure 2 x 12's of ramp are properly blocked.
  - l. Properly tie down rig to barge prior to moving barge.
  - m. Load equipment to properly distribute loads on barge; use proper knots for all tie-downs.
  - n. Attach safety rope to perimeter of barge prior to moving barge.
3. Towing and anchoring barge.
  - a. Be familiar and comply with all applicable Coast Guard regulations and safe boating practices.
  - b. Properly attach guy lines from barge to boat to assure control of barge.
  - c. All personnel on boat and barge shall wear life jackets while towing barge.
  - d. At least one anchor shall be ready to deploy as an emergency brake.
  - e. Maintain a sufficiently slow speed to prevent barge from "dolphining".
  - f. Properly coil and stow all ropes on barge to prevent entanglement with personnel.
  - g. When deploying anchors, utilize at least two personnel on boat, one to operate the boat and one to catch and deploy anchor lines.
  - h. Do not allow anchor lines to become wrapped around any part of your body.
4. Drilling
  - a. If working in a tidal zone, set casing at either high tide or low tide so that tidal currents are at a minimum.
  - b. Night work-have sufficient number of lights. At least one standard (two lights) of lights should be deployed at each corner of the barge.
  - c. Lights should also be oriented so that the surrounding water is illuminated in the event a "man overboard" situation arises.  
Properly display "barge working" signal.
  - d. All personnel should maintain vigilant awareness of work progress and safety and weather and water conditions.
  - e. Monitor anchor lines periodically throughout the work shift to ensure anchor stability.
  - f. Be continually aware of tidal fluctuations and current directions; as these change, they will affect barge stability and crew boat location.
  - g. Signal lights shall be displayed when working at night.
  - h. Good housekeeping shall be maintained to avoid tripping hazards; keep decks clear of drilling fluids and other tools and equipment.
  - i. Store all tools, supplies and equipment in secured places at all times to prevent items from falling on personnel.
  - j. Be careful of slippery decks and unsure footing.
  - k. Keep a boat at the barge for emergency exit at all times.
14. It is required to wear lifejackets while working on the barge at all times. Lifejackets shall also be worn whenever the barge is being moved.

## APPENDIX

## **Appendix A**

### **REFERENCES**

1. Caltrans Safety Manual, 1992, State of California Department of Transportation
2. Code of Safe Operating Practices, Division of Highway Maintenance, State of California Department of Transportation.
3. Drilling Safety Guide, International Drilling Federation.
4. Driller's Safety Manual, 1990, U. S. Bureau of Reclamation.
5. Maintenance Manual of Instructions, 1982, with updates, State of California Department of Transportation.
6. Manual of Recommended Safe Operating Procedures and Guidelines for Water Well Contractors and Pump Installers, 1993, National Water Well Federation.
7. Safety Regulations, 1993, Christensen Boyles Corporation.  
f)
8. Traffic Manual, 1985, with 1990 updates, State of California Department of Transportation.